FINAL TERMS OF REFERENCE FOR THE ENVIRONMENTAL ASSESSMENT REPORT

HALIFAX-DARTMOUTH METROPOLITAN SEWAGE TREATMENT FACILITY

25 JUNE 1991

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FOREWORD

This document comprises Terms of Reference which have been prepared in accordance with the "Final Guidelines For The Terms of Reference For The Halifax Harbour Cleanup Inc. Halifax-Dartmouth Metropolitan Sewage Treatment Facility Environmental Assessment Report" issued by the Nova Scotia Department of the Environment in consultation with the Federal - Provincial Environmental Assessment Review Panel and dated March 30, 1991, and comments arising from the review of the Draft Terms of Reference dated May 13, 1991.

Italicized notation to the right of each subsection heading cross-references these Terms of Reference to the Final Guidelines. These provide assistance for the reviewer of this document to verify that the intent of the guidelines has been incorporated into these Terms of Reference. The Terms of Reference have been organized in point form for clarity and ease of comparison.

An environmental assessment of the proposed Halifax-Dartmouth Metropolitan Sewage Treatment Facility will be undertaken by Halifax Harbour Cleanup Incorporated (HHCI). The purpose of the environmental assessment is to evaluate potential positive and negative impacts of the proposed Project on the environment and to show how the Project will be developed in an environmentally acceptable way. The objectives of the Terms of Reference are to provide details of the approach to the environmental assessment in accordance with the Final Guidelines, the manner in which the findings will be presented in the Environmental Assessment Report, and the manner in which the findings will be used in the implementation of the Project.

EXECUTIVE SUMMARY OF THE ENVIRONMENTAL ASSESSMENT REPORT

The Environmental Assessment Report (EAR) will include an Executive Summary which will provide a concise non-technical overview of the results of the assessment. A glossary of technical terms will also be included in the EAR in the form of an appendix.

Guideline Reference

1.0 INTRODUCTION AND CONTEXT *1.0*

1.1 Report Methodology *1.1*

This environmental assessment incorporates the approach of Beanlands and Duinker (1983) in that it will be focused on assessing impacts to Valued Environmental Components which include both Valued Ecosystem Components and Valued Socioeconomic Components.

A combination of existing information, new analyses, and field studies will be employed to fully document the existing environment. The approach will make full use of the numerous studies that have been carried out to date, some of which are published and others which are in progress. Anticipated new information requirements are outlined in the Terms of Reference below. Review of the knowledge of the existing environment, both biophysical and socioeconomic, will provide a basis for establishing boundaries for a set of Valued Environmental Components, which will receive detailed impact assessment. The significance of potential impacts will be evaluated and details will be provided on methods to be utilized to avoid, minimize, or reduce to an acceptable level potential negative impacts. An outline for an Environmental Protection Plan will be provided to present practical mitigation for construction and operation of the facility as well as define a program for surveillance, compliance and environmental effects monitoring.

1.2 Overview of the Project *1.2*

The intent of the Project overview is to set the context for the environmental assessment. This section of the EAR is anticipated to be brief, as much greater detail on the Project components is provided later. It will incorporate the following points:

- a brief description of the proposed Project, employing descriptions used in the Project registration and public handout materials by HHCI to date
- an overview of the spatial and temporal boundaries of the Project
- a description of the municipalities involved in the operation of the Project, including a historic and projected overview of serviced population growth, percentage of population, including residential, commercial and industrial developments, serviced with sewer systems and including/not including sewage treatment provided to date, and percentage of population to be serviced over the life of the Project; this will include the possibility of expansion of the Project to serve other areas within these municipalities including the areas served by the Mill Cove and Eastern Passage plants or to serve additional municipalities, and requirements necessary to accommodate this.
- the sources, quantities and characteristics of the wastewater to be handled, drawing upon the Phase 3 Halifax Inlet Water Quality Study (CBCL Limited, 1987), the ongoing flow monitoring study by HHCI, projected flows/quality and other relevant sources and include a description of expected Combined Sewer Overflows (CSO) and the philosophy for the management of CSO's
- anticipated Project life cycle, from planning through to replacement and potential upgrading phases, and identification and subsequent coordination of the activities of proponents, operators and/or agencies responsible at each phase

- definition of Project elements which hinge on funding agreements between federal, provincial and municipal levels of government and identification of any constraints or implications for the Project associated with these funding agreements
- description of the public information that was provided and public input gathered during the Project development and environmental assessment processes so far, and indicate further plans for the remainder of the public review stage

2.0 PROJECT DESCRIPTION

The Project description section will identify and describe the Proponent and provide an overview of the Project through all phases of development. The Project description will describe reasons for the undertaking and alternatives to the Project and summarize details on the following:

2.1 The Proponent *1.2*

- describe HHCI's structure and mandate, making reference to its relationship to the funding agencies, regulators, and agencies responsible for operating and managing the Project

2.2 History of the Project *2.0*

- identify the investigations, studies, task forces, and hearings which have been carried out relative to Halifax Harbour and sewage treatment requirements; summarize how they have brought about the present situation; identify the role they will have in the environmental assessment

2.3 Reasons for the Undertaking *2.0*

- outline the present situation of sewage disposal in the Metropolitan area
- describe the collective and individual responsibility to improve waste handling, treatment and disposal. Consider ethics (responsibilities of individuals and organizations in waste management), human and ecosystem health, and the need to meet short and long term economic, social environmental and development needs
- state the role of the Project in terms of regional development
- state the role of the Project in the context of reduction, reuse, recycling and recovery of wastes
- state the environmental quality objectives pertinent to the Project; make reference to the Halifax Harbour Task Force Final Report (1990) and its initial establishment of harbour use objectives and the Project's role in achieving them
- state the reasons for selecting the proposed Project concept in the context of existing and emerging alternatives in wastewater management technologies and strategies

2.4 Alternatives Considered: Why and How Decisions Were Made

2.4.1 The No Project Scenario *3.0*

- outline the no Project scenario
- state the conditions which would prevail should the undertaking not be carried out

2.4.2 Public Involvement in Consideration of Alternatives *3.0*

- summarize the historic public involvement in the discussion and review of alternatives to the Project, and how the public will continue to be involved in the consideration

of alternatives; with a focus on the Environmental Control Council hearings, the Task Force meetings, and the public involvement process sponsored by HHCI

2.4.3 Site Evaluation Process 3.4

- introduce and define the criteria used for selecting the alternative sites during the course of the Task Force study and the subsequent site evaluation studies conducted (HHCI n.d., 1991).
- detail the criteria used for comparative evaluation of the sewage treatment facility sites, collection system alternatives and effluent discharge site(s) and the rationale for the selection of these. Discussion shall include but not be limited to:
  - alternative routes and sites considered, including the possibility of multiple sites
  - availability of land for future expansion or upgrading
  - compatibility of the proposed use with existing land and water uses (including anchorages), land and Harbour use objectives/controls and other regulatory requirements
  - visual impacts
  - impacts of construction, maintenance and operation
  - impacts of infilling/excavating parts of the Harbour
- describe how the site evaluation process included considerations of social equity issues
- describe the public involvement process with respect to selection of the routes and sites

2.4.4 Establishment of Design Capacities *3.1*

- describe the various methods available and outline the method used for establishing design capacities
- detail the expected catchment areas by municipality and areas which may be served in these municipalities, including future projections
- describe and evaluate alternatives for establishing design capacity including the use of water conservation programs, storm water management programs and future separation of combined sewers into storm and sanitary sewers
- make reference to current alternative technologies of sewage flow reduction and management

2.4.5 Source Control Alternatives *3.2*

- discuss the implications of not controlling hazardous and toxic chemicals at source
- address control at source alternatives, and quality and quantity of organics
- indicate the means in place for the control of hazardous and toxic chemicals at source, focusing on existing municipal by-laws for sewage
- describe the alternatives that could be implemented for the control of hazardous and toxic chemicals at source, and what authority would have to implement them

2.4.6 Collection System Alternatives *3.3*

- describe possible alternatives for the collection systems, focusing on major routing options for trunk collectors and location options for lift stations and pumping stations
- predict the total energy demand for these alternative collection systems
- describe the goals and alternatives for the management of CSO's, addressing current technology options

2.4.7 Treatment Plant Alternatives *3.4*

- treatment level and type
- introduce the alternative treatment types employed in North America for sewage
- detail criteria used for evaluating alternative treatment technologies and selecting the proposed treatment method
- describe the bypass and overflow goals at the plant
- describe the alternative levels of treatment, including the expected removal rates for suspended solids and other contaminants for each level
- detail the reasons for the selection of the proposed treatment level
- provide conceptual cost estimates used in the type and level of treatment selection
- describe the cost implications of including the Mill Cove and Eastern Passage plants in the collection and treatment system
- describe the implications of plant enclosure, including underground burial, compared to a non-enclosed plant

2.4.8 Sludge Management Alternatives *3.5*

- provide an overview of alternative sludge management technologies, including the oil from sludge (OFS) technology and conventional disposal methods, and addressing conceptual costs and funding implications; make particular reference to the findings of the Sludge Management Study (UMA Limited, 1989)
- describe the practicality of applying OFS to one or more sewage treatment facilities in the metropolitan area including the two existing facilities
- describe the energy implications of no use of OFS, partial use of OFS and full use of OFS

2.4.9 Effluent Discharge Alternatives *3.6*

- introduce and define the criteria used for selecting the alternative sites during the course of the Task Force study
- detail the criteria used by HHCI for comparative evaluation of the sites and the rationale for selection of site
- introduce alternative locations considered in previous studies for the outfall diffuser
- describe the review and selection process employed in the Task Force Report in recommending the outfall diffuser location in the Inner Harbour
- describe the "containment" and "dispersal" strategies for outfall siting, including the knowledge of the probable fate of suspended particulates under each strategy and the uncertainties given the present level of knowledge of harbour behaviour; state the reasons for preference for the "containment" strategy
- describe study process relating to refinement of diffuser location within the inner harbour

2.4.10 Proposed Project Configuration

This section will summarize the proposed project configuration and provide the rationale for its selection.

2.5 Project Components *4.1*

This section of the Environmental Assessment Reports sets out and defines at a conceptual level the key elements of the Project.

2.5.1 Design Process *4.1*

- the design of the facility is reported on to the stage it has been completed when the EAR is prepared; describe the design process itself in the context of the overall Project.

2.5.2 Wastewater Characteristics *4.1.1*

- describe the quantitative and qualitative aspects of wastewater components, and detail the known sources of these components
- describe possible quantitative and qualitative changes in wastewater characteristics through the application of water conservation, control at source or pretreatment of hazardous and toxic substances, organic loading and management of stormwater
- indicate the conceptual costs and benefits associated with the application of these wastewater management strategies

2.5.3 Collection System *4.1.2*

- provide an overview of the existing collection system, with details of sanitary sewers, storm sewers and combined sewers, interceptors and overflow structures
- describe programs to manage stormwater inflow to the treatment plant collection system
- describe the planned collection system, including the selected locations for tunnels, pumping stations and forcemains
- describe the criteria for determining when surface or buried collectors will be used
- describe the criteria for managing combined sewer overflows and discuss the design principles and objectives for overflow management

- describe the locations and numbers of existing and planned overflow structures and pumping stations, including plans for elimination of overflows, including those to the Northwest Arm
- describe the system storage capacity for stormwater and how this will affect the frequency of overflows
- describe the expected overflow volumes in relative terms to stormwater runoff and river inputs to Halifax Harbour
- describe the planned level of treatment at overflows and pumping stations, and describe any plans for disposal of residuals
- describe expected energy requirements, and any energy conservation or recovery measures planned
- provide conceptual cost information for modifications and additions planned for the collection system
- describe plans to separate storm sewers from sanitary sewers, and how these would affect the treatment and collection system, and what the timing of these changes could be; make reference to pilot projects being undertaken in the various jurisdictions
- describe plans for expansion of collection services to future developments or diversion of flows from the existing Mill Cove or Eastern Passage sewage treatment plants, and what provisions for these have been incorporated into planning for the Project

2.5.4 Treatment Plants *4.1.3*

- provide a conceptual description of the planned regional treatment plant and the treatment facility at Herring Cove, with associated conceptual cost estimates
- describe the provision for future expansion to receive flows diverted from the Mill Cove and Eastern Passage sewage treatment plants

- discuss the potential for climate change and related sea level changes, and how these have been accommodated in design considerations for the Project
- describe the provisions planned for future expansion of the facilities
- describe the provisions planned for upgrading of treatment level and the potential land requirements for expansion options
- list the chemicals to be stored at the facility, and identify the requirement and provide the framework for contingency plans dealing with spills or other mishaps, including fire or explosion, involving chlorine or any other chemicals which may be stored or used at the facility
- describe the expected quantities of methane gas which will be generated and the proposed means of methane gas management
- describe the possible odours, visible emissions and noise levels expected in the operation and maintenance of the proposed facility
- describe anticipated waste products from the facility and describe plans for their management, including transportation and disposal
- describe site access and plans for vehicle movements, including special transportation links and related infrastructure required
- describe anticipated energy requirements and planned energy conservation and recovery methods to be incorporated in the design of the Project
- describe the visual considerations to be incorporated in the facility design
- identify the planned agencies and management structures for the operation and maintenance of the treatment facility; and comment on jurisdictional issues or responsibilities related to facility operations and maintenance

2.5.5 Sludge Management *4.1.4*

- describe the planned oil from sludge (OFS) facility and the processes and products, including conceptual cost information

- identify the sources and anticipated quantities of sludge to be processed
- provide a characterization of the oil product, including potential uses, and identify the regulatory implications for product uses
- describe the planned transportation and on site storage and handling methods for sludge
- describe the anticipated energy requirements for the OFS facility, and any energy conservation or recovery methods to be incorporated into the design of the facility
- detail the expected ash characteristics and quantities to be generated
- discuss methods of transportation to be used
- discuss requirements for ash management, including disposal
- describe the anticipated air emissions from the OFS facility
- describe the framework for contingency plans for sludge management, including disposal locations and methods, if the OFS facility shuts down or cannot continue to be operated for any reason
- identify the anticipated owners, operators and managers of the OFS facilities

2.5.6 Effluent Discharge *4.1.5*

- describe the effluent discharge component of the facilities along with conceptual cost information
- provide conceptual sketches showing the diffuser arrangement, illustrating its position in the water column and the plume behaviour under average conditions and storm conditions
- describe the anticipated dispersal and expected fate of the effluent, addressing both dissolved and particulate fractions; make forward reference to the environmental assessment sections of the EAR which consider effluent behaviour
- describe the diffuser design as related to water density stratification and maintenance of dilution of the effluent

- describe any provisions for future expansion of the effluent system as either extensions to the diffuser or addition of other diffusers

2.6 Construction *4.2*

This section of the EAR addresses the anticipated plans for construction of the facility, with reference to those elements which may have effects on identified Valued Environmental Components. Mitigation sections of the Terms of Reference outline the approach to mitigative measures and environmental protection plans (EPPs) which will be integrated into the construction phase. The following points include common engineering practices which will be addressed in the document and incorporated into construction practices:

- identify the agencies, financing, financial arrangements, management structure and jurisdictional responsibilities for Project construction
- provide an overview of construction activities, using a Gantt chart format (bar graphs relating activities to timing) of scheduling
- describe infrastructure and facilities specific to the Project
- detail land acquisition requirements, easements and permits; identify requirements for authorization of construction
- describe geological, geophysical and geotechnical considerations, including the possibility of gas in sediments which may affect diffuser placement and the likelihood of erosion around the diffuser
- describe anticipated types and properties of fill to be used in infilling if necessary
- describe excavations, backfilling and site reclamation
- describe potential damage to wells and subsequent potential effects on well water quantity and quality
- describe potential damage to private property

- describe management of construction wastes including solid wastes, sanitary wastes and oils
- describe disposal of excavated slates and any other acid generating materials
- describe management of disruptions of normal treatment and disposal during the construction and commissioning of the facilities
- describe the construction process for construction roads and related traffic, excavations, and backfilling

2.7 Operations and Maintenance *4.3*

- describe the funding sources and associated implications for the Project and the financial management of the facility, with conceptual cost estimates for annual operating budget, and long term capital budget for system replacements and comment on the jurisdictional issues or responsibilities related to facility operation and maintenance
- identify the planned agencies and management structures for the operation and maintenance of the collection facilities and OFS facility and comment on jurisdictional issues or responsibilities related to their operation and maintenance
- detail normal operational requirements for personnel and their occupations, equipment, supplies storage and services, maintenance, preventive maintenance and transportation for staff and materials to and from the site
- define the expected removal efficiencies for wastewater constituents and the resultant effluent characteristics
- describe the potential for production of unwanted contaminants, such as chlorinated organics
- characterize the expected sludge and residual ash production
- characterize the expected air emissions from the facilities
- state the expected response to monitoring results in adjustments to operations

- specify the expected interruptions or non-routine events and how these can be expected to affect operations, to include the effects of:
  - unusual precipitation or snowmelt events, with the expected frequency of combined sewer overflows
  - breaks in the collection system
  - "contamination" of the biological treatment and OFS system from abnormal wastewater constituents
  - untreated discharges and expected contaminant concentrations and loadings
  - exceedance of the treatment capacity of the system
  - failure of the OFS plant, or generation of sludge beyond the operating capacity of the OFS plant
  - break or damage to the outfall pipe or diffuser
  - corrosion on facility components
  - change in equipment or system to react to adverse monitoring results
  - electrical interruptions

2.8 Abandonment or Replacement *4.4*

- outline the probable timing and possible scenarios, including financing, for abandonment or replacement of the Project facilities
- comment on jurisdiction and responsibilities related to abandonment or replacement of the Project facilities

2.9 Schedule *6.0*

- provide a schedule for the Project through the decision making and design process, construction and operation

- discuss a projected schedule for abandonment or replacement (e.g. renewal of infrastructure), both complete and partial, of the Project

2.10 Personnel

- describe the likely personnel requirements at each stage of the Project, including numbers, skills, gender-specificity, sources and special training requirements

2.11 Regulations, Standards and Approvals *5.0*

- list relevant regulations, standards, guidelines, codes, bylaws, policies and approvals applicable to the Project during all phases
- identify the government agencies responsible for administering the above
- identify any site specific environmental quality objectives applicable to various regions of the harbour, as a function of existing harbour uses
- outline the anticipated means of determining the responsibility for management, the ownership and the operation of the Project
- state any new agreements, legislation, regulations, by-laws or ordinances that are anticipated to be required to establish the ownership, operation, monitoring and abandonment of the Project and its components

3.0 BOUNDARIES *1.1, 1.2, 9.2*

3.1 Biophysical

- establish temporal boundaries for impacts on the biophysical systems through the Project life cycle

- establish terrestrial study boundaries for biophysical assessment based on preliminary review of environmental effects during construction, operation, and abandonment
- evaluate possible air emissions for odour and quality and dispersion from the facility above guideline levels (specify) and include possible area of elevated values within the terrestrial study boundary
- establish marine study boundaries for the biophysical assessment
- establish marine study boundaries for construction in the immediate area of the Harbour floor for placement of piping and diffuser
- establish marine study boundaries for operations for areas which may receive effluent with levels of contaminants higher than water quality guidelines (specify) under worst case conditions; initially this boundary is anticipated to be no greater than the outer limit of Box E in the Task Force Report (1990)
- establish marine study boundaries in the area of any possible Harbour infilling
- consider possible extensions of study boundaries into areas downstream, downwind or down current which have not been included in the other boundary definitions

3.2 Socioeconomic

- designate socioeconomic study boundaries to include two levels of investigation:
  - the areas within the four municipalities that will be serviced by the operation of the system
  - all areas affected by the construction and operation of the wastewater management system components including the collection system, the plant, overflow structures and pumping stations, new access and transportation routes, and new fill material sources.
  - consider future projections as well as present conditions

3.3 Administrative

- designate administrative boundaries to include:
  - municipalities contributing to and benefitting from the construction of the sewage treatment plants (i.e., City of Halifax, City of Dartmouth, Town of Bedford, and County of Halifax)
  - stakeholders in the construction and operation of the project

4.0 EXISTING ENVIRONMENT

New information in the form of field research and new analysis of existing information will be carried out to supplement current information as required.

4.1 The Biophysical Environment

4.1.1 Terrestrial Environment *7.1.1.1*

4.1.1.1 Terrestrial Physical Environment

- generally describe the physical setting of the Project
- describe the terrestrial environment within the terrestrial study boundaries in its components of topography, water resources, both surface and groundwater, surficial and bedrock geology, soils, meteorological conditions and aesthetic physical resources; this will be accomplished using readily available information, airphoto interpretation, and field reconnaissance

4.1.1.2 Terrestrial Chemical Environment *7.1.1.2*

- describe the terrestrial chemical environment within the terrestrial study boundaries, addressing background levels of water, air, and soil/bedrock quality
- describe and present available air quality data, primarily by making use of Environment Canada data sources
- identify available surface water quality data, and obtain representative samples for water quality for water bodies within the terrestrial study boundaries; interpret water quality characteristics in terms of background conditions
- characterize the soil profile for the areas to be influenced by construction of the treatment facility
- evaluate potential for acid generation through the disturbance of acid generating bedrock; make use of available geological mapping supplemented with bedrock samples obtained during predesign investigations

4.1.1.3 Terrestrial Biological Environment *7.1.1.3*

- characterize the biological ecosystems within the terrestrial study boundaries, including land based and freshwater resources; this is anticipated to be undertaken utilizing available published and unpublished information
- describe biological resources identified among the initial Valued Ecosystem Components and other special resources identified in the examination of the general biological ecosystems; site specific field investigations will be required, such as stream electrofishing surveys, nesting site surveys, habitat evaluations, vegetation surveys and ecological land classification.
- special reference will be made to parks, protected areas, and noteworthy concentrations of biological resources, where they occur within the study boundaries, such as:

- the upper areas of Sea View Park
- Point Pleasant Park (particularly around Quarry Pond and behind the houses on Chainrock Drive)
- the jack pine stand along the highway near York Redoubt
- McNabs Island
- Purcells Cove Backlands including the area of Flat Lake, Purcells Pond, and Colpit Lake Barrens.

♦ The description of the biological environment will include those portions of the terrestrial environment that have been heavily modified by human settlement and land use, and lakes and watercourses potentially affected by stormwater or other overflow.

4.1.2 Marine Environment

A wide body of literature and reports exists within which the characterization of the marine environment will be developed. The marine environment description will depend mainly on the existing data. Subsections below highlight instances where additional site specific data may be required.

4.1.2.1 Marine Physical Environment *7.1.2.1*

♦ provide an overview of the physical conditions of the Harbour, including the following topics: bathymetry, sediments and bedrock, water structure and temperature, freshwater inputs, currents, tides and circulation, sediment transport and climatic effects on harbour conditions

♦ describe the processes of deposition and resuspension of particulate matter, and relate these to currents and exchanges between harbour water and the ocean

♦ highlight uncertainties in the information base relative to harbour currents, sediment behaviour, and resulting dispersion of effluent discharged to the harbour

4.1.2.2 Marine Chemical Environment *7.1.2.2*

- characterize the marine chemical environment in both seawater and sediments, and the levels of organic and inorganic contaminants measured in previous studies
- describe spatial and temporal variation that has been previously reported: make reference to short and long term variations
- determine inputs of pollutants by source, quantity and quality through analysis and measurement of present representative outfall conditions, and existing information and estimate annual loads, seasonal variations, and storm related contaminant inputs
- determine the variation of wastewater outfall quality in both dry weather flows and through storm runoff events
- relate water and seawater quality information to environmental quality guidelines, particularly those identified through the Task Force
- relate marine waters and sediment quality to Halifax Harbour Task Force recommendations for seawater, sediment and biota
- relate marine waters and sediment quality to guidelines for various uses, which include shellfish harvesting, bathing and contact recreation, fish and wildlife habitat, boating, industrial cooling and aesthetic values
- discuss the assimilative capacity and carrying capacity of the Harbour to maintain the levels of contaminants at acceptable levels for aquatic life
- relate the present conditions to the Guidelines for Protection of the Marine Environment Against Pollution from Land-Based Sources (the Montreal Guidelines) and an international convention to be based on the Montreal Guidelines

4.1.2.3 Marine Biological Environment *7.1.2.3*

- characterize the marine communities in the harbour from existing knowledge in terms of mode of life, and seasonal changes, migrations, fish and wildlife habitat, and noteworthy biological occurrences of marine life
- examine the biological conditions in the immediate area of the proposed diffuser site and identify benthic species diversity as well as the food and indicator species in the immediate surrounding area; this will be undertaken using marine biological surveys
- determine the baseline chemical body burden of the representative identified food and indicator species, and determine the tissues or organs where wastewater derived pollutants may concentrate
- examine for and report any evidence of bioaccumulation, biomagnification, or incidence of diseases or other effects that may be related to existing wastewater derived pollutants

4.2 The Socioeconomic Environment

The socioeconomic descriptions will be based primarily on available information, but where original information is required, field reconnaissance and survey techniques will be employed.

4.2.1 Local Community Profile(s) *7.2.4*

- outline the community's key development, environmental, economic and social concerns in the past and present including implications for this Project
- define the social community boundaries around the sites for major Project components including the plant, collection system, pumping stations, and new access and transportation routes

- identify the community's main concerns about this Project and how these concerns were identified
- provide relevant demographic and socio-economic information for affected areas including resident population and projected population, community type and character, economic activity and employment sources and types, significant community features, recreational and conservation/environmentally sensitive lands, existing traffic patterns and level of service, and historical and cultural factors

4.2.2 Halifax Harbour Uses *7.2.5*

- describe the uses of Halifax Harbour including marine shipping and transportation, related land transportation, recreation, commercial and recreational fisheries as well as fish holding facilities and consumption of Harbour catches, tourism, holding and experimental facilities for scientific research, defence research, shipyards, cooling water, infilling and dredging and waste disposal
- inventory and map relevant tourism and hospitality establishments adjacent to the harbour
- identify potential new uses, opportunities for expansion or relocation of existing uses
  - identify current environmental or other constraints affecting uses and potential uses, e.g. impacts of current water quality on windsurfing, and spatial conflicts between uses
- identify the key stakeholders in Halifax Harbour use and management
- identify existing planning, management or information exchange mechanisms (formal and informal) in place for Halifax Harbour and their implications for the proposed wastewater management system

4.2.3 Land Use *7.2.3*

- describe and map land use patterns within the defined socioeconomic boundaries of the affected area(s)
- map proposed development activity, other than this Project, and known future land use patterns from official plans and planning strategies within the defined boundaries of the affected area(s)
- identify existing planning processes that have a direct bearing on existing and future land uses at the local, regional, provincial and federal levels which have bearing on the affected areas of the Project
  - describe pertinent aspects of those planning processes to ascertain potential impacts the Project will have on the processes
- identify areas requiring special consideration which are to be protected or left undisturbed and detail the reasons for the protection or avoidance of these areas
- identify areas requiring special protection measures
- describe and map the present property values within the defined socio-economic boundaries of area(s) affected by the Project

4.2.4 The Built Environment *7.2.1*

- describe development in the area defined for socioeconomic assessment
- describe major infrastructure serving the proposed site sewage treatment plant and immediate vicinity

4.2.5 Archaeological/Heritage Resources *7.2.2*

- identify all known and potential archaeological and heritage resources located within the areas of the treatment plant site, other Project components and all associated infrastructure needed to service the site
- specific resource types to be considered are as follows:
  - known and potential buildings of historic or architectural significance located within the areas of the treatment plant and associated infrastructure
  - known and potential Native and Euro-Canadian sites within the area of the treatment plant
  - known and potential Native and Euro-Canadian sites located along underground and underwater pipelines; particular attention will be given to resources associated with eighteenth and nineteenth century urban development (e.g. the Sellon site), wharves and other shoreline features, including landfilling activities
  - known and potential underwater sites at the sewage treatment facilities outfall locations

4.2.6 Aesthetic Environment *7.1.1.4*

- describe the visual resources found within the aesthetic environment, both on land and freshwater, within the boundary area being considered for the Project, with special reference to:
  - a general visual description of landforms
  - topographic relief
  - vegetative cover
  - surface waters and wetlands

- unique natural and human-made features and land/water interfaces, e.g. coastline form, beaches, back shore lands, etc.

♦ describe the visual resources of the terrestrial environment including those portions of the environment which have been modified by human settlement and major infrastructure works

♦ describe major view planes which will be evident after the Project has been constructed, including those which:

- are currently recognized within the region from both terrestrial and marine vantage points
- are of importance from the standpoint of tourism, traditional local usage, cultural and historic significance
- may be created as a result of the Project

5.0 VALUED ENVIRONMENTAL COMPONENTS

5.1 Valued Ecosystem Components

♦ identify Valued Ecosystem Components (VECs) and the basis for their identification

5.2 Valued Socioeconomic Components

♦ identify Valued Socioeconomic Components (VSCs) and the basis for their identification

6.0 IMPACT ASSESSMENT METHODS *8.1*

♦ define the context within which the significance of changes in the Valued Environmental Components will be determined

- clearly describe the relationships between the routine Project activities (construction, operation, abandonment, replacement), accidental events and the Valued Environmental Components
- set out quantitative impact predictions wherever possible; state the level of confidence in predictions; define level of impacts, whether positive, negative, chronic, or cumulative
- for cases where quantitative approaches are applicable, apply the approach of risk assessment, through examination of releases, pathways, receptors, and exposure impact evaluation
- state the degree to which impact predictions can be measured for their validity over the short and long term
- define methods for evaluating residual impacts

7.0 BIOPHYSICAL IMPACT ASSESSMENT *9.1*

Biophysical impact assessment will be conducted using the methods defined above in Section 6.0, in which potential impacts on identified VECs are defined.

The biophysical impact assessment and analysis will relate Project construction and operational activities or elements to specific VECs. Detailed discussion of impacts and the basis for impact predictions will be presented in the text. This text will be supported by summary matrices, which will graphically depict these interactions. For each identified impact the following factors will be considered:

- geographical extent of the impact
- duration of the interaction
- frequency of the occurrence
- magnitude of impact at the population level where relevant

- the range of possible impact ratings
- the level of confidence associated with the rating

A description of the biophysical impacts will include a discussion of the following:

- the assimilative and carrying capacity of the inner and outer Harbour with respect to the effects of effluent discharges over the design life of the Project
- fish populations in the Harbour
- introduction of concentrations of pathogens into the marine environment
- fates and effects of pollutants
- anticipated impacts of consolidating existing outfalls and locating new overflow sites including:
  - the potential for alteration of the existing flux of contaminants from the Harbour bottom sediments and associated effects on benthic biota
  - the potential for remobilization of contaminants from sediments in the Harbour
- effects of infilling a portion of the Harbour in terms of currents and water circulation, sediment erosion and deposition, lobster and fish habitats, and marine biological communities
- the expected environmental effects of an interruption of electrical service to the facility
- the potential impacts on terrestrial biological communities, including osprey, on McNabs Island

8.0 SOCIOECONOMIC IMPACT ASSESSMENT

Socioeconomic impact assessment is conducted using the methods defined above in Section 6.0 in which potential impacts on VSCs are defined. Examples are provided in the following subsections, in order to illustrate the approach for specific socioeconomic elements.

8.1 Community Impacts *9.1, 9.2.1*

- assess community impacts for all phases with respect to the following matters:
  - describe impacts associated with the privately transported sludge from county plants and privately transported septage to the regional plant
  - determine the expected alteration of traffic patterns in existing communities
  - evaluate visual and aesthetic impacts
  - determine the expected impacts associated with provision of domestic water and electrical services to the facility
  - determine the requirement for lighting of the site and the potential effect of such lighting on surrounding areas
  - determine the effect of increases in noise levels and odour effects during construction and operation, on day-to-day lives of residents within the area defined for socioeconomic study, taking into account similar activities already established in the area
  - determine the long term socioeconomic impacts if either or both of the Eastern Passage and Mill Cove systems are or are not brought into the regional system
  - estimate effects on property value from the facility for existing and future land use
  - forecast disruption in use of community/recreation features within the potential impact area
  - describe likelihood of damaging private property
  - describe impacts on health and safety (public and occupational)
  - describe impacts on municipal finance and infrastructure
  - describe impacts on recreation
  - describe potential impacts on the commercial and recreational fishery of Harbour, port operations and other Harbour uses

- discuss the potential impacts of the proposed diffuser location(s) on vessel safety and Harbour anchorages
- determine the effects of the facility and its associated infrastructure and ancillary uses on the natural character and aesthetic value of McNabs Island and on the recreational experiences of visitors
- assess impacts of infilling on the fishery, worker safety and Harbour traffic
- real or perceived impacts of a possible adjacent infilled site on the quality and integrity of McNabs Island as an outdoor recreational/heritage resource in the Metropolitan area.
- effects and associated risks of transporting staff, supplies, sludge and ash during operation to worker safety, Harbour ecosystem, and Harbour traffic

8.2 Archaeological/Heritage Impacts *9.2.1*

- ♦ determine the potential effects of the facility and its associated infrastructure and ancillary uses on areas of known or potential archaeological or heritage resources and describe the strategies necessary to identify, protect or otherwise control impact upon those sites
- ♦ conduct archaeological testing within those areas identified in Section 4.2.5 as having moderate to high archaeological potential
- ♦ conduct architectural assessment of those buildings and sites identified in Section 4.2.5 to be of historic or architectural significance
- ♦ assess the significance of the archaeological and heritage resources in light of the potential threat posed by the development
- ♦ determine the potential effects of the facility and its associated infrastructure and ancillary uses on historical and archaeological sites, and describe the strategies necessary to identify, protect or otherwise control the impact upon those sites

8.3 Aesthetic Impacts *9.2.3*

- identify, in visual format, the visual and aesthetic impacts of the Project's major physical components on the environment. Describe the scale, massing, form and character of:
  - the treatment plant facility and other buildings
  - above ground pumping, interceptor, and overflow structures
  - access roads, piping, fencing and screening devices
  - transmission corridors including overhead and below ground electrical power and collection/discharge system corridors
  - landform elements modified for purposes of constructing the Project
  - other support structures which will be visually exposed in the environment
- describe how visible components of the Project will be sited in the terrestrial and marine environments
- describe how major elements will be sited on the landscape, how landforms will be modified by construction activities, and what design, siting and landscape techniques will be utilized to screen, buffer, ameliorate or feature visual impacts on the aesthetic environment
  - for aspects of the Project where the visual impacts of the built forms are to be minimized or camouflaged describe how this will happen and describe the post-construction visual aspects of the Project
  - for those aspects of the Project which may be visually featured describe how this will happen and what the resulting visual form will be

Emphasis will be placed on the visual impacts of the Project from major view planes, and how the post-construction visible forms will affect those view planes.

8.4 Tourism Impacts *9.2.2*

- carry out an impact assessment of constructing and operating the facility at the proposed site on tourism including:
  - effects on the tourism and hospitality establishments adjacent to the harbour
  - describe the effect of the facility in the proposed location on the tourism attraction potential of Halifax Harbour and McNabs Island
  - describe the effect of the facility on existing and potential boat tours in Halifax Harbour.

8.5 Opportunities Created and Enhanced

- determine direct investment in Nova Scotia from outside sources in plant construction.
- determine potential ancillary industries supplying or servicing the facility and its employees or employing its byproducts.
- determine any other significant economic activities permitted or enhanced by construction or operation of the plant, such as tourism and marine recreation

9.0 MITIGATION MEASURES *10.0*

This section of the Environmental Assessment Report will address potential mitigation programs, rehabilitation, compensation packages, and enhancement measures; as well it will present a framework for an environmental protection plan (EPP) designed to minimize or avoid both routine and accidental impacts during construction, operation and abandonment of the facilities.

The overall approach to mitigation will be to consider a full range of mitigative opportunities including:

- prevention as the first line of defence
- human and biophysical avoidance
- site design and planning, both spatially and temporally
- environmental protection planning
- specific biophysical and socioeconomic mitigative measures not normally included in standard environmental protection planning

9.1 Biophysical Mitigation Measures

- Mitigation for Facility Construction
  - develop a list of activities during construction which may require mitigation programs; such a list is likely to include factors such as truck movement, temporary road access, drainage control including any acid drainage, erosion and sediment control, fugitive emissions, excavated material disposal, blasting/excavation, and other activities identified during the environmental assessment
  - describe mitigation programs to address each of the items on the list of activities; a point form approach is most likely to be employed
  - highlight situations where standard specifications and construction practices are anticipated to provide adequate mitigation, and situations where site specific approaches will be necessary for environmental protection
- Mitigation for Facilities Operations
  - develop a list of facility operational features which require mitigation programs; segregate the list into chronic and accidental categories
  - define the duration and area of influence associated with chronic events, such as:
    - overflows
    - diffuser(s) effluent

- noise
- lighting
- fugitive emissions
- methane gas
- traffic
- flaring
- waste products disposal

- define the duration and potential area of influence associated with accidental events, such as:
  - chemical spill
  - bypass of treatment system
  - failure of treatment system
  - shutdown of the OFS facility
  - pumping station failure
  - outfall breakage
  - diffuser destruction or impaired operation
  - electrical outage

A practical, field-useable environmental protection plan will be necessary to identify the procedures and safeguards which will be applied during the construction and operation of the facility. The outline of this plan will be provided in the EAR. The plan itself will be developed in conjunction with the results of the impact assessment and mitigative measures; it will also include a chemical management plan, environmental inspection, education and orientation requirements, a list of permits and authorizations from the regulatory agencies, contingency plans and a list of key contact persons.

9.2 Socioeconomic Mitigation

- define socioeconomic mitigation programs to address the VSCs; the program will describe proposed compensation packages when applicable, including the elements of compensation management, compensation applicability, and methods of estimation of compensation requirements
- identify the potential compensation techniques to be provided for property owners and others adversely affected by construction activities
- describe approaches taken in general to minimize adverse socioeconomic effects and enhance positive socioeconomic effects of the facility; these may address, for example, factors such as:
  - access improvement
  - park development
  - aesthetic enhancement
- describe a strategy for mitigating any negative impacts on significant archaeological and heritage resources caused by the development and operation of the facility and associated infrastructure; mitigative measures will address avoidance, protection and recovery of resources, as well as, monitoring and salvage or emergency recovery

10.0 RESIDUAL IMPACTS *11.0*

This section of the environmental assessment will serve as a summary of the environmental costs and benefits of the Project. Both positive and negative residual impacts will be evaluated and discussed.

10.1 Biophysical Residual Impacts

- discuss anticipated biophysical residual impacts

10.2 Socioeconomic Residual Impacts

- discuss anticipated socioeconomic residual impacts

11.0 MONITORING *12.0*

Monitoring program objectives and framework, program elements, compilation and reporting methods, and definition of "action levels" associated with monitoring results will all be addressed in this section of the Environmental Assessment Report.

11.1 Baseline Data Requirements

- baseline requirements for data to be collected, and analysis needed before any of the identified monitoring programs can be initiated, will be identified

11.2 Surveillance Monitoring during Construction

- describe plans for monitoring environmental elements during construction activities; this will include plans for identification, reporting, temporary protection, rehabilitation, and recovery of artifacts or features of historical or archaeological significance encountered during construction

11.3 Compliance Monitoring

- describe the compliance monitoring programs to be implemented upon facility commissioning, addressing:
  - air emissions (point source, fugitive emissions)
  - volumes, flow rates, composition and concentration of waste stream inputs
  - liquid discharges from overflows, pumping stations and at the treatment facilities
  - effectiveness of sewage treatment
  - solid waste disposal, including ash disposal
  - oil from sludge operations
  - dangerous goods and hazardous wastes management
  - discharges to the marine environment, including fine particulates in the effluent
- detail the reporting mechanisms and procedures for corrective responses
  - define action levels and conditions under which detection of hazardous or toxic materials in the influent waters would require initiation of corrective response or reporting.

11.4 Environmental Fate and Effects and Residual Impacts Monitoring

- identify and define proposed environmental effects monitoring (EEM) programs based on the findings of the Environmental Assessment Report
- identify the framework for field and office studies associated with confirming the presence of positive or negative biophysical impacts

11.5 Abandonment and Replacement Monitoring

- detail the procedures of any abandonment monitoring to be conducted, e.g. the replacement or relocation of an overflow structure .

12.0 PUBLIC INFORMATION AND INVOLVEMENT PROGRAM *13.0*

12.1 To Date

- outline the public information and involvement programs that have been carried out by all agencies, including the proponent, up to the submission of the EAR

12.2 Proposed

- describe how the Proponent intends to work with the public and local community(ies) near the treatment facilities throughout the planning and life of the Project
  - explain how information will be exchanged and identify opportunities for local involvement in decision making
  - describe any plans to establish a community liaison group or negotiate a siting agreement
- describe the mechanisms for continued public involvement when the construction of the collection and treatment facilities have been completed
- describe any plans for continued public involvement or educational activities related specifically to the treatment facility

13.0 LITERATURE CITED

- the EAR will include a list of all literature and personal communications cited in the report

APPENDICES

- to improve the readability of the report, the EAR will include in the appendices supporting technical and other information, which is pertinent to the review of the assessment, but which is not essential to the main body of the report

GLOSSARY OF TERMS

One of the appendices of the EAR will include a glossary of terms used in the report and a listing of all acronyms used in the report.

REFERENCES CITED IN THE TERMS OF REFERENCE

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